



Spectral Gamma-Ray Borehole Log Data Report

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Borehole

10-04-01

Log Event A

Borehole Information

Farm : <u>A</u>	Tank : <u>A-104</u>	Site Number : <u>299-E25-61</u>
N-Coord : <u>41,345</u>	W-Coord : <u>47,774</u>	TOC Elevation : <u>688.11</u>
Water Level, ft :	Date Drilled : <u>5/31/1962</u>	

Casing Record

Type : <u>Steel-welded</u>	Thickness : <u>0.280</u>	ID, in. : <u>6</u>
Top Depth, ft. : <u>0</u>	Bottom Depth, ft. : <u>125</u>	

Borehole Notes:

This borehole was drilled in May 1962 and completed to a depth of 75 ft with 6-in.-diameter casing. In October 1976, the borehole was deepened to 130 ft and completed at a depth of 125 ft. There is no indication in the driller's log or Chamness and Merz (1993) that the casing was perforated or that the borehole was grouted.

A 6-in.-diameter casing was used to process the SGLS data. It is assumed that the casing thickness is 0.280 in., on the basis of the published thickness for schedule-40, 6-in. pipe, as observed by the logging engineer. The top of the casing is the zero reference for the SGLS. The casing lip is even with the ground surface.

Equipment Information

Logging System : <u>1</u>	Detector Type : <u>HPGe</u>	Detector Efficiency: <u>35.0 %</u>
Calibration Date : <u>04/1996</u>	Calibration Reference : <u>GJPO-HAN-5</u>	Logging Procedure : <u>P-GJPO-1783</u>

Logging Information

Log Run Number : <u>1</u>	Log Run Date : <u>09/18/1996</u>	Logging Engineer: <u>Alan Pearson</u>
Start Depth, ft.: <u>125.5</u>	Counting Time, sec.: <u>100</u>	L/R : <u>L</u> Shield : <u>N</u>
Finish Depth, ft. : <u>52.0</u>	MSA Interval, ft. : <u>0.5</u>	Log Speed, ft/min.: <u>n/a</u>
Log Run Number : <u>2</u>	Log Run Date : <u>09/19/1996</u>	Logging Engineer: <u>Alan Pearson</u>
Start Depth, ft.: <u>53.0</u>	Counting Time, sec.: <u>100</u>	L/R : <u>L</u> Shield : <u>N</u>
Finish Depth, ft. : <u>0.0</u>	MSA Interval, ft. : <u>0.5</u>	Log Speed, ft/min.: <u>n/a</u>
Log Run Number : <u>3</u>	Log Run Date : <u>09/19/1996</u>	Logging Engineer: <u>Alan Pearson</u>
Start Depth, ft.: <u>65.0</u>	Counting Time, sec.: <u>100</u>	L/R : <u>L</u> Shield : <u>N</u>
Finish Depth, ft. : <u>50.0</u>	MSA Interval, ft. : <u>0.5</u>	Log Speed, ft/min.: <u>n/a</u>



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Logging Operation Notes:

This borehole was logged in three log runs. Two logging runs were required to complete the logging of the borehole. An additional log run was performed to repeat an interval of the borehole as a quality check. The total logging depth achieved by the SGLS was 125.5 ft.

Analysis Information

Analyst : R.R. Spatz

Data Processing Reference : MAC-VZCP 1.7.9

Analysis Date : 03/24/1998

Analysis Notes :

The pre- and post-survey field verification spectra for all logging runs met the acceptance criteria established for peak shape and system efficiency. The energy calibration and peak-shape calibration from these spectra were used to establish the peak resolution and channel-to-energy parameters used in processing the spectra acquired during logging.

A casing correction factor for 0.280-in.-thick casing was applied to the log data during the analysis process.

Shape factor analysis was applied to the SGLS data. Insights are provided into the distribution of radionuclide contaminants and into the nature of zones of elevated gamma-ray activity not attributable to gamma-emitting radionuclides.

Log Plot Notes:

Separate log plots show the man-made and the naturally occurring radionuclides. The natural radionuclides can be used for lithology interpretations. The headings of the plots identify the specific gamma rays used to calculate the concentrations. Uncertainty bars on the plots show the statistical uncertainties for the measurements as 95-percent confidence intervals. Open circles on the plots give the MDL. The MDL of a radionuclide represents the lowest concentration at which positive identification of a gamma-ray peak is statistically defensible.

A combination plot includes the man-made and natural radionuclides, the total gamma derived from the spectral data, and the Tank Farms gross gamma log. The gross gamma plot displays the latest available digital data. No attempt has been made to adjust the depths of the gross gamma logs to coincide with the SGLS data.

The interval between 50 and 65 ft was relogged as an additional quality check and to demonstrate the repeatability of the radionuclide concentration measurements made by the SGLS. A comparison of the measured concentrations of the man-made and naturally occurring radionuclides using the data sets provided by the original and repeated logging runs is included with Appendix A. The measurements repeat within two standard deviations (95-percent confidence level), indicating excellent repeatability of the measured gamma-ray spectral peak intensities used to calculate the radionuclide assays.

A plot of the shape factor analysis results is also included. The plot is used as an interpretive tool to help determine the radial distribution of man-made contaminants around the borehole.

Results/Interpretations:



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The only man-made radionuclide detected around this borehole was Cs-137. Cs-137 contamination was detected continuously from the ground surface to 10 ft and at 51 ft. The measured concentrations from the ground surface to 10 ft ranged from 0.2 to 8 pCi/g. The maximum Cs-137 concentration was 8 pCi/g at 1 ft. The measured concentration at 51 ft was just above the MDL at about 0.2 pCi/g.

The K-40 concentrations decrease at about 20 ft from a general background of about 17 pCi/g above this depth to about 15 pCi/g from 20 to 53 ft. Between 53 and 72 ft, the K-40 concentrations decrease to about 12 pCi/g. Below 73 ft, the K-40 concentrations increase to a general background of about 18 pCi/g and remain at about this concentration to the bottom of the borehole (125.5 ft). The Th-232 concentrations increase slightly below 72 ft.

The interval from 50 to 65 ft was relogged as an additional quality check. The man-made and natural radionuclide concentrations were determined independently, using data sets provided by the original and repeated logging runs. The calculated concentrations were within the two sigma (95-percent confidence level), indicating excellent repeatability of peak gamma-ray intensity used for the radioassay calculations.

An analysis of the shape factors associated with applicable segments of the spectra was performed. Comments on the interpretation of the shape factor results are presented in the Tank Summary Data Report for tank A-104. Additional interpretative comments are also presented in the Tank Summary Data Report for tank A-104.